CLAIM AMENDMENTS

581. (Currently amended) A composition, comprising particulate apatite having an average apatite particle size of less than 1μm, an average apatite crystal size of less than 150 nm, ~~and~~ a surface area of at least 40 m^2/g, and wherein the particulate apatite undergoes apatite phase decomposition of less than 10% when exposed to conditions of at least 1300 °C for at least 2 hours.

582. (Previously Presented) The composition of claim 581, wherein the particulate apatite has a surface area of at least 60 m^2/g.

583. (Previously Presented) The composition of claim 582, wherein the particulate apatite has a surface area of at least 100 m^2/g.

584. (Previously Presented) The composition of claim 581, wherein the particulate apatite has an average apatite particle size of less than 0.5 μm.

585. (Previously Presented) The composition of claim 581, wherein the particulate apatite has an average crystal size of less than 100 nm.

586. (Previously Presented) The composition of claim 581, wherein the particulate apatite is densified.

587. (Canceled)

588. (Previously Presented) The composition of claim 581, further comprising an auxiliary structural additive.

589. (Previously Presented) The composition of claim 588, wherein the auxiliary structural additive comprises a ceramic additive.

590. (Previously Presented) The composition of claim 589, wherein the ceramic additive comprises a metal oxide.

591. (Previously Presented) The composition of claim 590, wherein the metal oxide comprises zirconia.

592. (Previously Presented) The composition of claim 588, wherein the auxiliary structural additive is a metal or alloy.

593. (Previously Presented) The composition of claim 588, wherein the auxiliary structural additive is present in an amount of between about 1% and about 50% by volume.

594. (Previously Presented) The composition of claim 581, wherein the particulate apatite is carbonated apatite.

595. (Previously Presented) The composition of claim 581, wherein the particulate apatite is admixed with an organic species.

596. (Previously Presented) The composition of claim 595, wherein the organic species is a self-assembling surfactant or a polymer.

597. (Previously Presented) An article comprising a densified apatite structure having a dimension of at least 0.5 cm and an average XRD crystal size of less than 250 nm, wherein the apatite structure undergoes phase decomposition of less than 10% when exposed to conditions of at least 1300 °C for at least 2 hours and has a compressive strength of at least about 150 MPa.

598. (Previously Presented) The article of claim 597, wherein the densified apatite structure has a density of at least about 90%.

599. (Previously Presented) The article of claim 598, wherein the densified apatite structure has a density of at least about 98%.

600. (Canceled)

601. (Previously Presented) The article of claim 597, wherein the densified apatite structure has a compressive strength of at least about 500 MPa.

602. (Previously Presented) The article of claim 601, wherein the densified apatite structure has a compressive strength of at least about 700 MPa.

603. (Previously Presented) The article of claim 597, wherein the phase decomposition is less than 5%.

604. (Previously Presented) The article of claim 597, wherein the densified apatite structure has an average XRD crystal size of less than 150 nm.

605. (Previously Presented) The article of claim 597, wherein the densified apatite structure comprises an auxiliary structural additive.

606. (Previously Presented) The article of claim 605, wherein the auxiliary structural additive comprises a ceramic additive.

607. (Previously Presented) The article of claim 606, wherein the ceramic additive comprises a metal oxide.

608. (Previously Presented) The article of claim 607, wherein the metal oxide comprises zirconia.

609. (Previously Presented) The article of claim 605, wherein the auxiliary structural additive is nanocrystalline.

610. (Previously Presented) The article of claim 605, wherein the auxiliary structural additive is a metal or alloy.

611. (Previously Presented) The article of claim 605, wherein the auxiliary structural additive is present in an amount of between about 1% and about 50% by volume.

612. (Previously Presented) The article of claim 597, wherein the densified apatite structure comprises carbonated apatite.

613. (Canceled)

614. (Previously Presented) The article of claim 597, wherein the article is at least part of a prosthesis.

615. (Previously Presented) The article of claim 614, wherein the article is a prosthesis.

616. (Previously Presented) The article of claim 597, wherein the article comprises an exterior coating on a prosthesis.

617. (Previously Presented) The article of claim 597, wherein the article is a bioactive implant.

618. (Previously Presented) The article of claim 617, wherein the bioactive implant is an orthopedic or dental implant.

619. (Previously Presented) The article of claim 612, wherein the carbonated apatite is a reactive layer on a bioceramic capable of enhancing bioactivity for bone growth.

620. (Currently Amended) An article comprising an apatite structure having a dimension of at least 0.5 cm, a density of at least about 98%, a compressive strength of at least about 500 MPa, ~~and~~ an average XRD crystal size of less than 250 nm, and wherein the apatite structure undergoes phase decomposition of less than 10% when exposed to conditions of at least 1300°C for at least 2 hours.

621. (Canceled)

622. (Canceled)

623. (Previously Presented) The article of claim 620, wherein the apatite structure has a compressive strength of at least about 700 MPa.

624. (Currently Amended) The article of claim ~~621~~ 620, wherein the phase decomposition is less than 5%.

625. (Previously Presented) The article of claim 620, wherein the apatite structure has an average XRD crystal size of less than 150 nm.

626. (Previously Presented) The article of claim 620, wherein the article is a prosthesis.

627. (Previously Presented) The article of claim 620, wherein the article is at least part of a prosthesis.

628. (Previously Presented) The article of claim 620, wherein the article comprises an exterior coating on a prosthesis.

629. (Previously Presented) The article of claim 620, wherein the article is a bioactive implant.

630. (Previously Presented) The article of claim 629, wherein the bioactive implant is an orthopedic or dental implant.

631. (Previously Presented) The article of claim 620, wherein the apatite structure comprises an auxiliary structural additive.

632. (Previously Presented) The article of claim 631, wherein the auxiliary structural additive comprises a ceramic additive.

633. (Previously Presented) The article of claim 632, wherein the ceramic additive comprises a metal oxide.

634. (Previously Presented) The article of claim 633, wherein the metal oxide comprises zirconia.

635. (Previously Presented) The article of claim 631, wherein the auxiliary structural additive is nanocrystalline.

636. (Previously Presented) The article of claim 631, wherein the auxiliary structural additive is a metal or alloy.

637. (Previously Presented) The article of claim 631, wherein the auxiliary structural additive is added in an amount of between about 1% and about 50% by volume.

638. (Previously Presented) The article of claim 620, wherein the apatite structure comprises carbonated apatite.

639. (Previously Presented) The article of claim 638, wherein the carbonated apatite is a reactive layer on a bioceramic capable of enhancing bioactivity for bone growth.

640-673. (Canceled)

674. (Previously Presented) An article comprising a consolidated apatite structure having a dimension of at least 0.5 cm, an average XRD crystal size of less than 250 nm, and a porosity of at least 20%, wherein the apatite structure undergoes phase decomposition of less than 10% when exposed to conditions of at least 1300 °C for at least 2 hours.

675. (Previously Presented) The article of claim 674, wherein the consolidated apatite structure has a porosity of at least 50%.

676. (Previously Presented) The article of claim 675, wherein the consolidated apatite structure has a porosity of at least 75%.

677. (Previously Presented) The article of claim 674, wherein the consolidated apatite structure has a compressive strength of at least about 150 MPa.

678. (Previously Presented) The article of claim 674, wherein the phase decomposition is less than 5%.

679. (Previously Presented) The article of claim 674, wherein the consolidated apatite structure has an average XRD crystal size of less than 150 nm.

680. (Previously Presented) The article of claim 674, wherein the consolidated apatite structure comprises an auxiliary structural additive.

681. (Previously Presented) The article of claim 680, wherein the auxiliary structural additive comprises a ceramic additive.

682. (Previously Presented) The article of claim 681, wherein the ceramic additive comprises a metal oxide.

683. (Previously Presented) The article of claim 682, where in the metal oxide comprises zirconia.

684. (Previously Presented) The article of claim 680, wherein the auxiliary structural additive is nanocrystalline.

685. (Previously Presented) The article of claim 680, wherein the auxiliary structural additive is a metal or alloy.

686. (Previously Presented) The article of claim 680, wherein the auxiliary structural additive is present in an amount of between about 1% and about 50% by volume.

687. (Previously Presented) The article of claim 674, wherein the consolidated apatite structure comprises carbonated apatite.

688. (Previously Presented) The article of claim 687, wherein the carbonated apatite is a reactive layer on a bioceramic capable of enhancing bioactivity for bone growth.

689. (Previously Presented) The article of claim 674, wherein the consolidated apatite structure is formed from an admixture of particulate apatite with an organic species.

690. (Previously Presented) The article of claim 689, wherein the organic species is a self-assembling surfactant or a polymer.

691. (Previously Presented) The article of claim 674, wherein the article is at least part of a prosthesis.

692. (Previously Presented) The article of claim 691, wherein the article is a prosthesis.

693. (Previously Presented) The article of claim 691, wherein the article comprises an exterior coating on a prosthesis.

694. (Previously Presented) The article of claim 674, wherein the article is a bioactive implant.

695. (Previously Presented) The article of claim 694, wherein the bioactive implant is an orthopedic or dental implant.

696. (New) A composition, comprising particulate apatite having an average apatite particle size of less than 1 μm, an average apatite crystallite size of less than 150 nm, a surface area of at least 40 m^2g, wherein the particulate apatite undergoes apatite phase decomposition of less than 10% when exposed to conditions of at least 1300°C for at least 2 hours and the crystal apatite having a structure from needle-like to spherical.

697. (New) The composition of claim 696 wherein the crystal structure has a length:width aspect ratio from 2.3:1 to 5.9:1.